

## Successful Removal of a Ruptured Silastic Percutaneous Central Venous Catheter in a Tiny Premature Infant

Ming-Chou Chiang<sup>1,3</sup>, MD; Yi-Hung Chou<sup>1,3</sup>, MD; Chiao-Ching Chiang<sup>1,3</sup>, NP;  
Hung-Tao Chung<sup>2,3</sup>, MD; Wen-Jen Su<sup>2,3</sup>, MD

The spontaneous rupture of a Silastic catheter is a rare occurrence. We describe our experience of managing a tiny premature infant with embolization of a Silastic percutaneous central venous catheter (PCVC) and discuss the possible mechanisms of the embolization. A 28-week, 980 g, preterm male infant received a Silastic PCVC (Epicutaneo Cava Catheter, Vygon, Germany) for parenteral nutritional support at 4 days of age. The catheter was introduced percutaneously and advanced without difficulty through the right antecubital vein, and was subsequently withdrawn 2 cm following confirmation of tip position using radiography. A following chest radiograph, taken 15 hours later, showed rupture of the catheter, and an echocardiogram revealed a piece of the catheter had lodged between the right atrium and the right ventricle. The dislodged fragment of the catheter was retrieved successfully using a snare catheter (Microvena, White Bear Lake, Minn) by a pediatric cardiologist without complications. We want to stress that clinicians should be aware that rupture of the catheter is rare and can also occur asymptotically and that an embolized fragment can be safely removed without extensive surgical manipulation, even in a tiny premature infant. (*Chang Gung Med J* 2006;29:603-6)

**Key words:** central venous catheter, percutaneous central venous catheter, peripheral venous catheter, prematurity.

The use of Silastic percutaneous central venous catheters (PCVCs) for central venous access is a routine and essential part of neonatal intensive care. Complications related to PCVCs have been reported including the rupture of catheters.<sup>(1-5)</sup> We herein describe our experience of managing a tiny premature infant with embolization of a ruptured PCVC.

### CASE REPORT

A preterm male infant weighing 1120 g was born to a 26-year-old mother with chorioamnionitis by vaginal delivery at 28 weeks of gestation. He was

intubated and treated with Survanta<sup>®</sup> for respiratory distress syndrome and was weaned off of mechanical ventilation later.

A Silastic PCVC (Epicutaneo Cava Catheter, Vygon, Germany) was placed through the right antecubital vein for parenteral nutritional support at 4 days of age, when his body weight was 980 g. Chest x ray (CXR), which was performed to locate the tip of the catheter, revealed the tip was in the right atrium, thus the catheter was withdrawn 2 cm, leaving a length of 13 cm of catheter in the vessel. A subsequent CXR, taken 15 hours after the first CXR, showed the catheter was broken (Fig. 1) and an

From the <sup>1</sup>Division of Neonatology, <sup>2</sup>Division of Pediatric Cardiology, Department of Pediatrics, Chang Gung Memorial Hospital, Taipei; <sup>3</sup>College of Medicine, Chang Gung University, Taoyuan.

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Correspondence to: Dr. Hung-Tao Chung, MD, Division of Pediatric Cardiology, Department of Pediatrics, Chang Gung Memorial Hospital, 5, Fushing Street, Gueishan Shiang, Taoyuan, Taiwan 333, R.O.C. Tel.: 886-3-3281200 ext. 8203; Fax: 886-3-3288957; E-mail: hungtao@cgmh.org.tw



**Fig. 1** Chest x ray shows an embolized fragment of the catheter in the right cardiac ventricle (black arrow).

echocardiographic examination confirmed that a piece of catheter was lodged between the right atrium and the right ventricle. During the critical period, the vital signs showed mean blood pressure of 31 mmHg, respiratory rate of 50 breaths/min, and pulse rate of 155 beats/min without arrhythmia.

The embolized fragment, which was 5 cm in length, was retrieved using a 4 F endovascular retrieval snare through a 4 F sheath (Amplatz “Goose-Neck” microsnare, Microvena, White Bear Lake, Minn), introduced via the right femoral vein, by a pediatric cardiologist. There was no cardiovascular compromise or other complications during the procedure, and the right leg moved without limitation thereafter. The follow-up CXR and echocardiogram showed normal cardiac status after the procedure. The infant developed moderate bronchopulmonary dysplasia but did not need oxygen therapy at discharge.

## DISCUSSION

Risks associated with the PCVCs include

intravascular thrombosis, sepsis, extravasation of infused fluid into a body cavity, and cardiac tamponade.<sup>(1)</sup> Rupture of PCVCs has been rarely reported in neonates.<sup>(2-4,6)</sup> To our knowledge, our patient is the smallest preterm infant afflicted with embolization of a PCVC, which was subsequently removed using percutaneous cardiac catheterization.

High-pressure infusion<sup>(4)</sup> and catheter damage by introducer needle<sup>(2,3)</sup> have been postulated to be the possible causes of fragmentation of percutaneous catheters. Certain factors have been considered to lead to the weakening of catheters and subsequent breakage. Khilnani et al. reported that malposition of the catheter in the cardiac ventricle results in weakening of the catheter secondary to the movement of tricuspid valves and ventricular contractions.<sup>(2)</sup> Bagna et al. speculated that repeated strain on the same point of the catheter, caused by flexion and extension in the axillary, led to the weakening.<sup>(6)</sup> In this patient, the line was placed by an experienced neonatologist, and it was used solely for the continuous infusion of parenteral nutrition. The catheter was withdrawn immediately with caution to correct the position subsequent to the first radiograph. A possible explanation for the rupture of the catheter in this case is that it may have occurred when it was repositioned or secondary to repeated mechanical stress.

Embolization of catheters may cause bradycardia or arrhythmia. However, as shown in our patient, it can also occur asymptotically. Careful review of the plain radiograph to locate the long lines is of utmost importance. Reece et al. recommended contrast injection for assessment routinely,<sup>(7)</sup> however, contrast injection might under- or overestimate the catheter length.<sup>(1)</sup>

Rupture of catheters is a rare complication of neonatal PCVCs. Clinicians should be aware of this potential lethal complication and be vigilant when reviewing the follow-up CXR. Should it occur, the embolized fragment can be retrieved using a percutaneous cardiac catheterization, even in a tiny premature infant.

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# 於一極低體重早產兒成功地取出斷裂的矽膠經皮式中央靜脈導管

江明洲<sup>1,3</sup> 周怡宏<sup>1,3</sup> 江巧琴<sup>1,3</sup> 鍾宏濤<sup>2,3</sup> 蘇文鈺<sup>2,3</sup>

矽膠導管自發性斷裂的情況非常罕見。我們報告處理矽膠經皮式中央靜脈導管斷裂於一名極低體重早產兒體內的經驗，並探究可能的發生機轉。一名 28 週，體重 980 公克的早產兒，在 4 天大時為使用靜脈營養，接受矽膠經皮式中央靜脈導管置入。導管是由右側肘前靜脈置入，後經 X 光確認位置，導管被外拔 2 公分。約 15 小時後，從 X 光片上懷疑導管斷裂，立刻安排心臟超音波檢查，證實有一斷裂的導管裂片嵌置於右心房與右心室之間。斷裂的導管裂片在兒童心臟科醫師的協助下，以心導管的技術，成功地將它取出。整個過程及後續追蹤，無出現任何併發症。我們強調，臨床醫師應知道導管可能會發生斷裂的少見副作用且可以沒有任何症狀。萬一不幸發生，即使是極低體重早產兒，仍可嘗試以心導管取出。(長庚醫誌 2006;29:603-6)

**關鍵字：**中央靜脈導管、矽膠經皮式中央靜脈導管、周邊靜脈導管、早產兒。

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長庚紀念醫院 台北院區 <sup>1</sup>新生兒科，<sup>2</sup>兒童心臟內科；<sup>3</sup>長庚大學 醫學院

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通訊作者：鍾宏濤醫師，長庚紀念醫院 兒童心臟內科。桃園縣333龜山鄉復興街5號。Tel.: (03)3281200轉8203; Fax: (03)3288957; E-mail: hungtao@cgmh.org.tw